

**OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD**

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**FINAL STATEMENT OF REASONS****CALIFORNIA CODE OF REGULATIONS**

TITLE 8: Chapter 4, Subchapter 4, Article 29, Section 1712 of the Construction Safety Orders

Hazards Associated with Reinforcing Steel and Other Similar Projections**MODIFICATIONS AND RESPONSE TO COMMENTS RESULTING FROM
THE 45-DAY PUBLIC COMMENT PERIOD**

There are no modifications to the information contained in the Initial Statement of Reasons except for the following substantive and nonsubstantive and/or sufficiently related modifications that are the result of public comments and/or Board staff evaluation. Nonsubstantive/sufficiently related modifications, e.g., adding or revising subsection titles, and minor organizational and editorial changes, are being proposed to improve the clarity of this section and are noted in the modified text contained in the 15-Day Notice of Proposed Modifications. In addition, the following substantive and sufficiently related modifications are proposed:

Section 1712. Reinforcing Steel and Other Similar Projections.**Subsection (b)**

A modification is proposed to add a definition for the term "Hooking", as this rulemaking also proposes to recognize the practice of hooking as a viable means of eliminating impalement hazards for employees working at grade. The modification defines hooking as "Vertical reinforcing steel bent over to an angle of 90 degrees or more, sufficient to prevent impalement." The modification is necessary to clarify the requirement for hooking in the proposed modifications to subsection (c), and provide an additional impalement protection option for employees working at grade.

[NOTE: Upon further comments and Board staff evaluation, the Board has decided to remove "hooking" as impalement protection at grade or same surface as recommended by the AGC. See the Board's response to Mr. Willwerth's comment received during the first 15-Day Notice.]

A modification is also proposed to amend the definition of "Job-Built" by replacing the term "similar materials" with the phrase "materials of equal or greater strength." The modification is necessary to clarify what is meant by "similar materials."

It is proposed to further modify the definition of “Troughs,” clarifying that they are designed to cover “two or more” exposed ends of reinforcing steel or similar projections so as to prevent impalement, “and which meet the applicable requirements in subsection (d).” The last sentence of the definition of “troughs” is proposed for deletion, as the Appendix reference is included in the modifications to proposed subsection (d). The proposed modifications are necessary to clarify the meaning of the term “troughs” as used in Section 1712.

Subsection (c)

A modification to subsection (c)(1) is proposed, which clarifies that when employees are working at grade or at the same surface as exposed protruding reinforcing steel or other similar projections, “all” exposed ends of protruding reinforcing steel “that extend up to 6 feet above grade or other work surface” shall be guarded with protective covers, troughs, “or by hooking.” The modifications are necessary to clarify which and at what height exposed ends of reinforcing steel are to be guarded, and that “hooking” is now an impalement protection option for work performed at grade or comparable surface.

Further modifications are proposed to add new subsection (3), which specifies that protective covers shall not be used to protect against impalement where the maximum height of fall exposure exceeds 7 ½ feet, unless the protective covers meet the requirement of subsection (d)(4)(D), a proposed new subsection pertaining to adjusting drop test specifications where fall heights exceed 7 ½ feet. This modification is necessary for clarification and to ensure that employees do not use protective covers as impalement protection at fall exposures exceeding 7 ½ feet, unless they meet specified testing criteria.

In addition, a modification is proposed to delete renumbered subsection (4), as this requirement is relocated to new subsection (d)(4) regarding job-built protective covers (see below). This modification is necessary for clarification and as part of the reorganization of the section, which will aid employers in locating and complying with these requirements.

Subsection (d)

Modifications are proposed to the subsection title to delete the specific reference to troughs (in addition to caps) and include “Specification, Testing and Approval” to more accurately reflect the subsection contents, given the following proposed modifications:

It is proposed to reformat subsection (d) so that subparagraphs (1) and (2) pertain to both manufactured and job-built protective covers; subparagraph (3)(A-C) pertains to manufactured protective covers; and subparagraph (4)(A-D) pertains to protective covers that are job-built.

Additional modifications are proposed as follows:

- ? Clarify that protective covers be made of wood, plastic or other materials of “equal or greater strength” in (d)(1), and relocate the requirement pertaining to job-built protective covers to proposed new subparagraph (4)(A).
- ? Relocate the “trough” reference in (d)(2) to new subparagraph (4)(C), and add the requirement that if the protective cover is round, it shall have a minimum diameter of 4 ½ inches.
- ? Add new subparagraphs 3(A) through (C) to consolidate the requirements that specifically pertain to manufactured protective covers.
- ? Add new subparagraphs 4(A) through (D) to consolidate the requirements that specifically pertain to job-built protective covers. Included is an “exception” to the requirement that job-built protective covers be designed as specified by a state-registered engineer, taken from existing subsection (c)(4) and modified to permit job-built troughs depicted in Appendix Plate C-25 at heights not greater than 6 feet above grade or other working surface. Also included is the 10-foot, 250-pound drop test requirement for protective covers from existing subsection (d)(2), and a new requirement specifying that this test be modified where fall heights greater than 7 ½ feet are anticipated.

These proposed reformatting modifications are necessary for clarification purposes and to enable the employer to easily locate and comply with those requirements pertaining to protective covers in general, as well as those specific to manufactured and job-built protective covers.

Subsection (e)

A modification is proposed to create a subsection title to read, “Fall Protection.” This modification is necessary to clarify to the employer the location of fall protection requirements contained in Section 1712.

Subsection (f)

Modifications are proposed to create a subsection title to read, “Securing Reinforcing Steel,” and add a requirement that guys, supports, and braces be installed and removed as directed by a qualified person. The proposed modifications are necessary to clarify to the employer the location of requirements pertaining to the securing of reinforcing steel and to ensure that only individuals knowledgeable about hazards and safety principles associated with the installation and removal of vertical reinforcing steel for walls, piers, columns, and similar structures direct such work.

Summary and Response to Oral and Written Comments:

I. Written Comments:

Nancy Moorhouse, Corporate Safety Director, A. Teichert & Son, Inc., by letter dated February 18, 2003.

Comment:

Ms. Moorhouse commented on the proposal to delete all references to caps from Section 1712 and questioned whether preventing the use of caps is necessary with regard to work performed “at grade”. Ms. Moorhouse questioned whether caps used at grade need to have the ability to withstand a drop test with an impact of a 250-pound weight dropped from a height of 10 feet. Ms. Moorhouse feels that this test criterion is not reasonable since no person working at grade would be falling 10 feet on reinforcing steel protected by caps. Ms. Moorhouse questioned whether there has been a history of injuries related to employees being impaled on rebar as a result of a failure of caps while working at grade, and if not, whether the cost to business and public agencies is justified.

Response:

Caps as defined in Section 1712(b) are manufactured devices that completely cover the exposed ends of reinforcing steel and have a flat or mushroomed surface at least twice the diameter of the reinforcing steel they are designed to cover. This definition for caps includes “mushroom” or “safety” caps which fail to meet the drop test requirements of Sections 344.90 and 1712 and have failed even less rigorous testing (See Drop Test Report, dated March 3, 1995, included as an additional document relied upon). Furthermore, manufacturers of mushroom or safety caps direct their customers not to use these types of caps as impalement protection devices because they are not designed to prevent penetration failure, even for “at grade work.”

Although the Board is unaware of injuries involving employee impalement at grade level as a result of cap failure, the Board is inclined to adhere to manufacturer recommendations that caps are not to be used for impalement protection. The proposed deletion of the definition and other references to caps is intended to eliminate inconsistent language in existing subsection 1712(c) that appeared to allow the use of mushroom or safety caps for impalement protection of employees working at grade.

Given these facts, the Board believes that the proposed amendment is necessary to ensure employee protection from impalement hazards, and that further modification is unnecessary.

The Board thanks Ms. Moorhouse for her comments, suggestion, and participation in the rulemaking process.

II. Oral Comments:

Oral comments received at February 20, 2003, Public Hearing.

Marti Stroup, representing the Associated General Contractors of California (AGC).

Comment:

Ms. Stroup expressed the AGC's support for the proposal to amend Section 1712 and stated that they concur with the proposed changes to improve the clarity of the proposal through reorganization. AGC also supports the following changes to the proposed regulation:

- ? To allow the practice of "Hooking" only for exposures at grade or same surface by addition of a definition and language in subsection (c)(l);
- ? To add a requirement in subsection (c)(1) to protect employees working at grade from impalement by guarding exposed ends of rebar that extend up to six feet above grade or other work surface;
- ? Reorganize the requirements for job-made protective covers into a proposed subsection (d) and remove specific testing requirements from the note and set them forth as a separate rule;
- ? Reorganize the requirements for manufactured protective covers and troughs into proposed subsection (e);
- ? Add a clause permitting manufacturers to produce special-purpose troughs or covers provided that they meet the engineering and testing requirements of subsection (d) for job-made protective troughs and covers; and,
- ? Add specific language to subsection (g) specifying that guys, supports, and braces be installed and removed as directed by a qualified person.

Response:

The Board agrees with Ms. Stroup and has modified the proposal to incorporate the AGC's recommended changes into the original proposal.

Steve Rank, Director of Safety & Health, representing the District Council of Ironworkers Safety Institute.

Comment:

Mr. Rank stated that the District Council of Ironworkers supports the recommendations regarding the hooking of rebar, the protective covers below 6 feet, the use of testing for covers, and also the installation and removal of guys, supports, and braces by a qualified person.

Response:

The Board agrees with Mr. Rank, as his recommendations reflect concurrence with those of the AGC's, and agrees to modify the proposal accordingly. (See also the Board's response to Ms. Stroup's comments above.)

Bill Jackson, Director of Safety & Environmental Affairs, Granite Construction Co.

Comment:

Bill Jackson commented on the proposed deletion of the definition of caps and asked what support there is in the rulemaking record for it. He stated that, in the past, the Board seriously considered allowing the use of caps to protect employees from the hazards of impalement or risk of impalement at grade. Mr. Jackson stated that, unfortunately, the proposal makes reference to impalement hazards associated with working 10 feet above grade. He stated that the test standard it refers to from the Division's regulations, test the impalement protection capability of a product by dropping a weight of 250 pounds from a height of 12 feet. He stated that this could not happen when an employee is working at grade adjacent to rebar and asked where the demonstration of need or necessity is. Mr. Jackson opined that the proposal is taking something out that seems to be working fine.

Response:

The Board agrees with Mr. Jackson that the Board originally considered the safety issues when approving the use of mushroom or safety caps for at grade work during the original promulgation of Section 1712. However, the Board recognizes that since then testing has shown that the mushroom or safety caps were unable to prevent penetration failure during drop tests at less than 10 feet above grade. According to a Drop Test Report, dated March 3, 1995, mushroom or safety caps failed drop tests using bags weighing 140 pounds dropped from a height of 60 inches. The mushroom or safety caps were unable to prevent penetration failure in all of these tests. Additionally, manufacturers direct their customers not to use mushroom/safety caps as impalement protection devices because these types of caps are not designed to prevent penetration failure, even at grade. The Board therefore disagrees with Mr. Jackson's assertion that the proposal involves the removal of an effective safety order because the mushroom or safety caps do not provide adequate impalement protection as shown by the test results. Consequently, the Board believes the term "Caps" should be deleted.

MODIFICATIONS AND RESPONSE TO COMMENTS RESULTING FROM
THE FIRST 15-DAY NOTICE OF PROPOSED MODIFICATIONS

There are no further modifications to the information contained in the Initial Statement of Reasons except for the following substantive and sufficiently related modifications that are the result of public comments to the 15-day Notice of Proposed Modifications mailed on September 22, 2003, and/or Board staff evaluation:

Section 1712. Reinforcing Steel and Other Similar Projections.

Further modifications are proposed to delete the proposed definition and practice of "hooking" in subsections (b) and (c), respectively, as a viable means of eliminating impalement hazards for employees working at grade. These modifications are the result of comments received during the first 15-Day Notice of Proposed Modifications as well as a video supplied by a commenter in which hooked rebar repeatedly failed as a means of impalement protection using drop tests.

Additionally, it is proposed to further modify the proposal by adding clarifying language to subsection (c)(3) specifying that the height of the fall exposure is measured to the top of the protective cover and not to the work surface.

These modifications are necessary for clarification purposes and to ensure that employees do not use hooked rebar as a means of impalement protection.

Summary and Response to Written Comments:

Lance Murray, Safety Manager, Lusardi Construction Company, by letter dated September 26, 2003.

Comment:

Mr. Murray stated that while the focus of the standard is impalement protection, the standard does not differentiate between vertical and horizontal rebar, nor at what degree angle rebar should be “hooked” to afford maximum impalement protection. Moreover, the standard does not address at what length rebar or other similar projections need to be covered, e.g., “hold down bolts” on residential construction projects where a bolt may extend two to three inches up from the concrete.

Response:

With regard to Mr. Murray’s comment pertaining to “hooking,” please see the Board’s response to Mr. Willwerth’s comment letter below.

In response to Mr. Murray’s comment regarding at what length rebar or similar projections need to be covered, i.e., what constitutes an impalement hazard, the Board believes this comment is outside the scope of the proposed modifications. However, the Board believes that in accordance with the proposal, the length at which rebar or similar projections would need to be covered is determined by whether or not the projection constitutes an impalement hazard. The Board recognizes that the regulation cannot possibly identify each and every worksite impalement hazard and, being a performance-based standard, gives discretion to the employer to make this determination. The Board also notes that employers needing assistance in making this determination can contact Cal/OSHA Consultation Services.

The Board thanks Mr. Murray for his comments and participation in the rulemaking process.

John Willwerth, Safety Director, J. L. Davidson Company, Inc., by letter dated October 9, 2003.

Comment:

Mr. Willwerth recommended changing the title of Section 1712 to read “Impalement Hazards” in order to eliminate the perception that the requirements in Section 1712 are limited to reinforcement steel.

As a result of drop tests performed on hooked rebar ends, Mr. Willwerth expressed concern regarding the method of hooking as defined in the first modifications of the proposal, and recommended that hooking not be included in Section 1712 as effective protection from impalement until specifications can be added to the definition of hooking that, when applied, would be sufficient to prevent impalement. Mr. Willwerth included a video of the drop tests which showed the effects when a 200-pound sand bag was dropped from 7 ½ feet for “at grade” protection and from 10 feet for “above grade” protection.

The tests were performed on various impalement-potential projections, including steel grade/form stakes, anchor bolts, hooked rebar and EMT conduit, all of which clearly caused the bag to be impaled.

Mr. Willwerth also asked for clarification regarding subsection (c)(3) and whether the prescribed fall height of 7 ½ feet was from the elevated work surface to the cover.

Lastly, Mr. Willwerth recommended adding the phrase “or any employee who may be exposed to the job-built protective cover, upon request” to subsection (d)(4)(A), which pertains to a copy of the engineering drawings depicting the job-built protective covers being kept at the worksite and being made available to the Division upon request.

Response:

Mr. Willwerth’s recommendation to change the title of Section 1712 to “Impalement Hazards” is outside the scope of the proposed modifications. The Board notes, however, that the proposed title of the section is consistent with the format of Title 8 sections surrounding Section 1712.

Board staff has reviewed the video submitted by Mr. Willwerth, which has been included as a material relied upon and has been made part of the rulemaking file, demonstrating drop tests on hooked rebar and has reconsidered whether or not sufficient testing and documentation has been conducted to support hooking as an alternative to a protective cover. Though the testing protocol shown in the video appears to be consistent with that specified in Title 8, Section 344.90(e), it remains unsubstantiated. Nevertheless, the video demonstrates failure of the hooked rebar to prevent impalement. The Board therefore concurs with Mr. Willwerth’s recommendation to remove “hooking” from the proposal (both the practice and definition) until such evidence is provided to prove otherwise.

The Board also agrees to clarify subsection (c)(3) regarding the 7 ½-foot fall height by specifying “to the top of the protective cover”.

And, with regard to Mr. Willwerth’s recommendation to add the phrase “or any employee who may be exposed to the job-built protective cover, upon request” to subsection (d)(4)(A), the Board notes that this comment is outside the scope of the proposed modifications. The Board would like to point out, however, that, as specified in the text, these job-built protective covers are required to be designed as specified by an engineer currently registered in the State of California, and a copy of the design is to be kept at the jobsite.

The Board thanks Mr. Willwerth for his comments and participation in the rulemaking process.

MODIFICATIONS AND RESPONSE TO COMMENTS RESULTING FROM
THE SECOND 15-DAY NOTICE OF PROPOSED MODIFICATIONS

There are no further modifications to the information contained in the Initial Statement of Reasons as a result of the second 15-day Notice of Proposed Modifications mailed on October 24, 2003, and/or Board staff evaluation.

Summary and Response to Written Comments:

There were no written comments received during the second 15-Day Notice of Proposed Modifications ending November 10, 2003, except for one written comment received on November 12, 2003 which was identified as being outside the scope of the proposed modifications.

ADDITIONAL DOCUMENTS RELIED UPON

? Drop Test Report, Dated March 3, 1995

This document is available for review during normal business hours at the Standards Board Office located at 2520 Venture Oaks Drive, Suite 350, Sacramento, California.

DETERMINATION OF MANDATE

This regulation does not impose a mandate on local agencies or school districts as indicated in the Initial Statement of Reasons.

ALTERNATIVES CONSIDERED

The Board invited interested persons to present statements or arguments with respect to alternatives to the proposed regulation. No alternative considered by the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the adopted action.